TRANSPORTATION RESEARCH
BULLETIN
A Publication of Idaho Transportation Department Research

Vol. II, No. 1 Fall 1998

Idaho Hosts Peer Exchange

The Idaho Transportation Department hosted a Research Management Peer Exchange during the week of December 14th. The Exchange capped an extremely busy fall season for the Research staff.

OBJECTIVES

The objectives of the Peer Exchange process were to look at three emphasis areas:

1. **PROGRAM DEVELOPMENT AND PRIORITIZATION**
   - ✓ Are we getting the "right" projects funded?
   - ✓ Are we properly balanced among technical areas?
   - ✓ What improvements can be made to our solicitation and project selection process?

2. **PROGRAM EFFECTIVENESS AND BENEFIT TO ITD**
   - ✓ Are the customers satisfied?
   - ✓ Can the customer use/are they using the research results?
   - ✓ Can our implementation procedures be improved?

3. **MARKETING OF ITD RESEARCH RESULTS**
   - ✓ Are newsletters effective?
   - ✓ What improvements should we make?
   - ✓ What questions should we ask of stakeholders in developing our research process?

THE PROCESS

The members of the Peer Exchange team included:

- Tim McDowell, P.E. State Transportation Programming, Wyoming DOT
- Liz Hunt, P.E., Research Coordinator, Oregon DOT

Continued on Page III, Col. 2

Several Research Projects Near Completion

RP-116B – Development of Machine Vision Technology, Training and Software Development

This project was initiated to develop the machine vision technology capability at the University of Idaho, provide training in the use of video monitoring of traffic operation, and develop portable video equipment for the use of both the University and the Department. Supplemental work has included evaluating alternative autoscope systems and additional data collection to validate and calibrate traffic flow simulation models.

Continued on Page IV, Col. 1

New Research Publications Are on the Horizon

Research Notes and Research Briefs:

In a continuing effort to expand communication opportunities, the Research staff has developed two new publications. The first, **Transportation Research Notes**, will provide preliminary discussions on one or more ongoing projects. They will be published on an unscheduled basis to report on major milestones reached in long-term projects. They will be distributed to the same mailing list as the **Transportation Research Bulletin**. The second publication, **Transportation Research Briefs** will cover only one project. They will be published at the completion of a project phase when it is determined that a formal interim or phase report is not justified. They will be distributed in accordance with the mailing lists used for distribution of both abstracts and formal reports. They will both be posted to the web. Anyone not on the above mailing lists who desires to receive a hard copy of either of the new publications can do so by notifying the research staff.

New Catalog of Research Publications Available

The new ITD Research Publications Catalog is now available. It documents the research reports that have been published by the Department since 1958. It includes an abstract for 103 reports as well as the type of report, research agency, author(s), and key words. The catalog is accessible via the Department's research web page. ***(See related article.)***

Reports included in the catalog cover the full spectrum of transportation subjects. They include: asphalt pavement testing procedures, bridge construction and maintenance, environmental impacts, land economics, pavement design, pavement failure case studies, pavement maintenance, pavement materials, pavement performance, soil stabilization, structural design, sufficiency ratings, traffic operations, travel forecasting, video imaging technology, and winter maintenance.

Research agencies represented in the catalog include the Department, Boise State University, Idaho State University, University of Idaho, Case Western University, Materials Research and Development, Inc. and Robert Greensfelder. Approximately sixty percent of the reports were written in-house, although in recent years, the trend has shifted toward more university-based research.

Update to the Research Web Page Is Well Underway

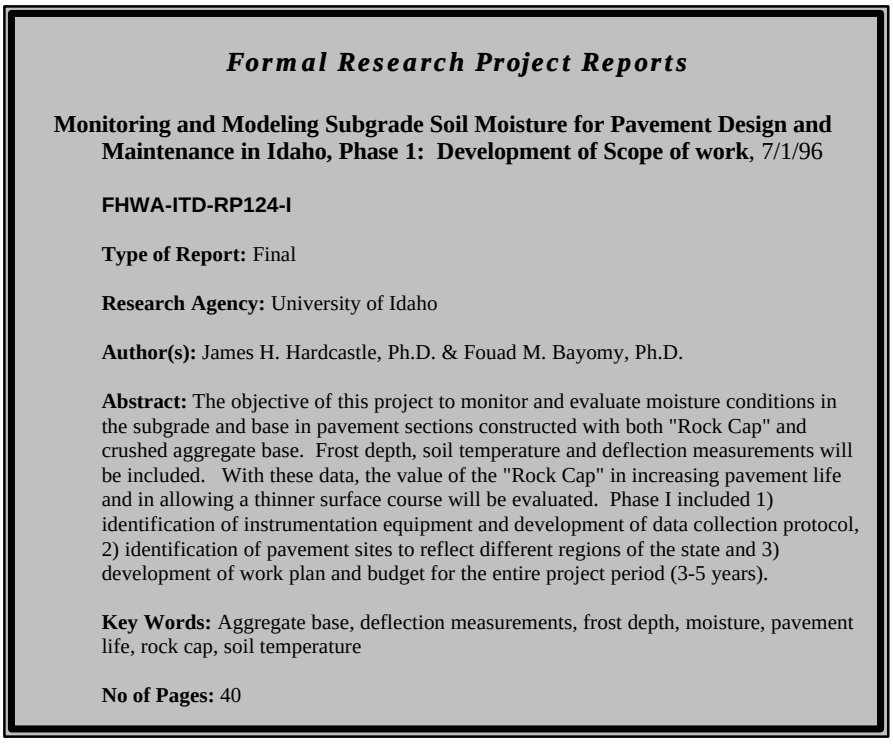
The first phase of the next major expansion of the Research Web Page is now operational. It includes two new features, which have been displaying an **"Under Construction"** tag:

ITD Research Publications Catalog
- Formal Research Projects

Status of Current Department Research
- Contract Research
- In-House Research

ITD Research Publications Catalog Page

The **Research Publications Catalog** page replicates the recently published catalog. The main page provides a listing of all available reports published by the Department. From the main page, one can select a more detailed view of individual reports as illustrated below. Future features planned include 1) a search engine to allow searching by title, author, subject or key word and 2) the ability to download the entire report rather than having to order a hard copy. It is planned to begin with the most recent reports, which are available in electronic format, and then scan the older reports that have been published during the last decade.



Formal Research Project Reports

Monitoring and Modeling Subgrade Soil Moisture for Pavement Design and Maintenance in Idaho, Phase 1: Development of Scope of work, 7/1/96

FHWA-ITD-RP124-I

Type of Report: Final

Research Agency: University of Idaho

Author(s): James H. Hardcastle, Ph.D. & Fouad M. Bayomy, Ph.D.

Abstract: The objective of this project to monitor and evaluate moisture conditions in the subgrade and base in pavement sections constructed with both "Rock Cap" and crushed aggregate base. Frost depth, soil temperature and deflection measurements will be included. With these data, the value of the "Rock Cap" in increasing pavement life and in allowing a thinner surface course will be evaluated. Phase I included 1) identification of instrumentation equipment and development of data collection protocol, 2) identification of pavement sites to reflect different regions of the state and 3) development of work plan and budget for the entire project period (3-5 years).

Key Words: Aggregate base, deflection measurements, frost depth, moisture, pavement life, rock cap, soil temperature

No of Pages: 40

Status of Current Department Research Page

The **Status of Current Department Research** is displayed on two separate main pages, one for contract research and one for in-house research. The main pages provide a listing of all current research projects. These include both active projects and proposed projects that have been approved for funding. From the main page, one is able to select a more detailed view of individual projects as illustrated below. The e-mail addresses of both the **ITD Technical Contact** and

ITD Contract Research in Progress

Project ID: RP116A **Project Name:** Development of Highway Design Visualization Technology, Training and Software Development

Project Status: ***ACTIVE*** **Funding Type:** Federal-HPR

Project Description: This project was initiated to develop CADDS training to ITD personnel and to develop the CADDS laboratory at the University of Idaho. A major product of this project has been the development of an automated plan sheet and quantity summary. Most recently the Department changed operating systems to the Windows NT system and to Microsoft Access database. This has necessitated alterations in the plan sheet program. Beta testing of the UNIX based program has been completed. Development of a version which will run effectively under NT and use the Access DBM is well underway, with beta testing planned for early in Calendar 1999 Completion of the program is expected in FY 1999.

ITD Technical Contact: Warren Hostetler, Design **Telephone:** 208-334-8494 **E-Mail:** whostetl@itd.state.id.us

Research Agency: University of Idaho **Principal Investigator:** Michael Kyte, Ph.D.

Dept: National Institute for Advanced Transp. Technology **Telephone:** 208-885-6002

Address: Engineering Physics Building Moscow, ID 83844-0901 **E-Mail:** mkyte@uidaho.edu

Contract Date: 9/7/93 **Funding #:** C 94-34 **Total Cost:** $186,847.00

Project Start Date: 8/1/93

Estimated Completion Date: 7/31/99

Completion Date:

the **Principal Investigator** will be hot links that will direct contact for more detailed information.

Change in Address

Because of these recent updates, the Materials webpage has been converted from **hyper text markup language (html)** to **active server protocol (asp)**. This allows the pages to be much more responsive to the user. The new Research address is therefore www2.state.id.us/itd/materials/Research/research.asp.

Peer Exchange (Cont. from Page I, Col. 1)

- Bob Raths, Research and Technology Transfer Program Manager, FHWA – Region 10
- Michael Kyte, Ph.D., P.E., Director, NIATT, University of Idaho
- Basil Barna, Manager, Transportation Infrastructure, Idaho National Engineering & Environmental Laboratory
- Robert Smith, P.E., Research & Asst. Materials Engineer, Idaho Transportation Department

To prepare for the Peer Exchange, each panel member was provided with copies of the following material: 1) list of Idaho's Research Advisory Committee membership, 2) ITD Organizational Chart, 3) Annual Research Work Program and Cost Estimate, and 4) the Idaho Research Manual.

During the exchange, the team discussed Idaho's procedures and those used by other team members' respective agencies. To collect information addressing the emphasis areas, core questions were asked of all the participants. The 21 participants included ITD managers, research program customers, and FHWA staff from the following eleven areas: Executive Management, District Three, Bridge, Construction, Environmental, Maintenance, Materials, Planning, Traffic,

Cont. on Page VI, Col. 2

Completion (Cont. from Page I, Col. 2)

The final report was received in November and was reviewed by the Technical Oversight Committee. It is expected to be published this month.

ITD Technical Contact: Mike Boydstun, Traffic
Telephone: 208-334-8569
E-Mail: mboydstu@itd.state.id.us

RP-121 – Upgrade and Metrification of the Idaho Overlay Design Program, WINFLEX

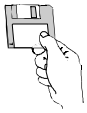
The objectives of this research project were two-fold. The performance prediction models used in WINFLEX were reviewed and new metric factors developed. The interface program as well as the SYSAN FORTRAN code was modified to allow for upgrade of the model and metric calculations in accordance with ITD metric conversion specifications.

The final report and software developed under Phase II were received in October of 1997. The software has been undergoing **beta testing** for the last year. It is expected that the final report for Phase II will be published in the near future.

ITD Technical Contact: Robert Smith, Materials
Telephone: 208-334-8437
E-Mail: bsmith@itd.state.id.us

RP-122 – Prestressed Bridge Girder Design Software - Upgrade

The previously developed program has been updated to include metric dimensions, new code requirements and an on-line help screen. The project has been completed and the Bridge Section has evaluated the software under operating conditions. A **Research Brief** describing the results of the project will be published



A follow-on project is being developed to address revisions to the AASHTO manual, which have occurred since completion of the software update. Also, changes recommended by Bridge staff based on the first year's use of the program will be incorporated.

ITD Technical Contact: Matt Farrar, Bridge Design.
Telephone: 208-334-8538
E-Mail: mfarrar@itd.state.id.us

RP-124 – Monitoring and Modeling Subgrade Soil Moisture for Pavement Design and Maintenance in Idaho

The objective of this project is to monitor and evaluate moisture conditions in the subgrade and base in pavement sections constructed with both "Rock Cap" and crushed aggregate base. Frost depth, soil temperature and deflection measurements will be included. With these data, the value of the "Rock Cap" in increasing pavement life and in allowing a thinner surface course will be evaluated.

Phase I of the project included 1) identification of instrumentation equipment and development of data collection protocol, 2) identification of pavement sites to reflect different regions of the state and 3) development of work plan and budget for the entire project period (3-5 years). The report is undergoing final review before publishing. **Phase II** includes 1) the procurement, testing and calibration of the instrumentation identified during Phase I; 2) basic soil testing for classification purposes; 3) instrumentation of selected sites; and 4) initial moisture and temperature data collection (pilot study). The results of Phase II will be covered by a **Research Brief**. The Work Plan for **Phase III** is being finalized. It will provide support for data collection and analysis and develop seasonal shift factors for mechanistic-based pavement design and evaluation

ITD Technical Contact: Robert Smith, Materials
Telephone: 208-334-8437
E-Mail: bsmith@itd.state.id.us

RP-125 – ITD Update of Winter Maintenance Complement Prediction Model

This project updated the previously developed **Winter Maintenance Complement Prediction Model** to include five additional years of data since 1990. The purpose of the

original project was to develop an automated system of reporting that would access ITD's average daily traffic files to calculate costs from the 1989 cost model. The system was to provide ITD maintenance personnel the ability to develop current year reports of benefits and costs for any proposed maintenance changes for any (or all) specified road segments. The system would not require any manual input, but could be used by specifying the road segment and the proposed maintenance level change. Traffic volumes and levels of service were updated to 1994 values under this project.

The final report is pending publication.

ITD Technical Contact: Bryon Breen, Maintenance
Telephone: 208-334-8417
E-Mail: bbreen@itd.state.id.us

RP-127 – Integrated Erosion Control Methods for Highway Construction and Slope Maintenance

This project is a multidisciplinary program to address surface erosion, sediment transport, and shallow slope failures common in highway construction. It was to provide novel approaches for erosion control and to provide technical guidance for enhanced design and rehabilitation of highway slopes. Treatments included low maintenance vegetation, different methods of increasing germination rate and growth, and engineering evaluations of slope geometry and reinforcement techniques. Vegetation test sites were established in highly erodible soils near Moscow and Sandpoint. Additional shrub planting sites were established near Weiser and Sandpoint.

A series of preliminary reports were developed under the second phase of the project and are being published this month as **Research Briefs**. The final report was received in December and is being reviewed by the Technical Oversight Committee prior to publication. The final report is expected to be published next month.

ITD Technical Contact: Charles Rountree, Plng
Telephone: 208-334-8203
E-Mail: crountre@itd.state.id.us

RP-128 – Camber Growth in Prestressed Concrete Bridge Girders

Recently Idaho tightened the specifications regarding camber growth in prestressed concrete girders. Some of the manufacturers claim that Idaho's method of calculating camber does not reflect current industry practice. This project has surveyed surrounding states, made field measurements of camber growth at prestress plants that supply Idaho and made a statistical evaluation leading to development of a new camber growth factor.

A preliminary draft of the final report has been received and reviewed by the Technical Oversight Committee. The Committee prior to acceptance of the report has requested an oral presentation.

ITD Technical Contact: Matt Farrar, Bridge Design.
Telephone: 208-334-8538
E-Mail: mfarrar@itd.state.id.us

RP-129 – Economic Impact of Work Zone Travel-Time Delays

ITD does not have a uniformly applied method to calculate the costs associated with traffic delays resulting from highway construction and maintenance projects. A travel-time cost model developed as part of the winter maintenance level-of-service research project may be applicable to the work-zone delay problem. **Phase I** of this project was intended to determine if this model is applicable or if there are other existing models that would be more applicable.

The **Phase I** final report is being prepared and is expected to be completed by the end of February. Depending on the results, **Phase II** will be initiated to develop a uniformly applied methodology to calculate the costs associated with traffic delays and safety factors resulting from construction projects. It is anticipated that better decisions regarding lane closures, detours, etc. could be made if the total costs of various options could be estimated and weighed against benefits.

ITD Technical Contact: Ron Mackelprang, Const.
Telephone: 208-334-8584
E-Mail: rmackelp@itd.state.id.us

Continued on Page VI, Col. 1

Completion (Cont. from Page V, Col. 2)

RP-131 – Development of a Microstation Tool to Compute Circuit Requirements for Lighting Design

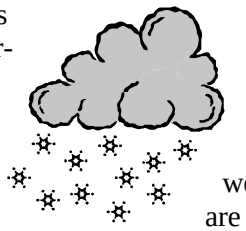
The objective of this study is to develop a Microstation application which will calculate circuit requirements for various electrical circuits in illumination / signalization projects, create tagged element data from the design, develop a database, and create a conductor / circuit schedule as well as material-quantity plan sheets with cost estimates.

The software specifications for the program have been completed. The "calculation engine" is currently being tested.

ITD Technical Contact: Terry McAdams, Traffic
Telephone: 208-334-8571
E-Mail: tmcadams@itd.state.id.us

RP-138 – Optimal Statewide Road Weather Information System (RWIS)

The objective of this project was to utilize remote sensors to gather snow and ice conditions to use as a basis for deploying winter maintenance forces. The SHRP program and other post-SHRP experiences have proven that a well planned, designed and operated Road Weather Information System (RWIS) in conjunction with the use of modern deicing/anti-icing chemicals can significantly increase winter-maintenance service levels and decrease maintenance costs. Currently, the locations of remote weather stations and sensors are based on staff opinion. They need to be strategically located to ensure optimal locations and improve information generated.



The final report was received in December and reviewed by the Technical Oversight Committee. Publication is expected by the end of the month.

ITD Technical Contact: Clayton Sullivan, Maint.
Telephone: 208-334-8405
E-Mail: csulliva@itd.state.id.us

Peer Exchange (Cont. from Page III, Col. 2)

FHWA – Idaho Division, and the University of Idaho.In general each interview began with an introduction of the team members and an explanation of the Peer Exchange process.

A series of ten core questions were asked of the participants with follow-up questions and the opportunity for the participants to ask questions of the team members. The core questions included the following:

1. Tell us about your role, what do you do for the department?
2. What do you see as the role of research in ITD?
3. How should upper management influence the direction of research and development in ITD?
4. How can research be improved at ITD?
5. How can credibility of the Research Unit be improved?
6. How can research implementation be improved?
7. How do you define implementation?
8. Do you get feed back regarding implementation?
9. Does the legislature and the public know what you are doing to help them?
10. In your opinion, what was a very successful project you were involved in and why was it successful?

Following the interviews, the Peer Exchange team members prepared a preliminary report and presented an oral report to the Executive Management of the Department as well as the participants. A formal report was distributed the following week.

OBSERVATIONS

Based on the input received during the interviews, the team members made several observations of areas where the research program at the Idaho Transportation Department could be strengthened. These include:

- There is a need for all of the State's institutions to understand each other's culture and needs.
- Communication has been good. Improvements can be made to increase interaction with other programs, move information to all levels of ITD employees.
- ITD needs to "toot-own-horn".
- Need to take advantage of participation in statewide program meetings (traffic, maintenance, etc.). Can

improve presence and knowledge of research within ITD.
- There is a need to improve the tracking of implementation results, pursue implementation process more aggressively.
- There is a need to institutionalize research within the Department. There seems to be a lack of understanding of how research can really payoff.
- Not getting broad-based input of research problem statements due to the short amount of time allotted for solicitation, review and approval of projects.
- Documentation of successes in research and publishing of that data is unknown to most within ITD and the public.
- University contracts can improve on meeting proposed schedules.
- There is a need to determine the appropriate future role of the Idaho Transportation Consortium

STRENGTHS

The Peer Exchange team noted several significant strengths within the Idaho Transportation Department. ITD has a research program of which they can be proud. Generally, the research process in Idaho is organized, logical and workable. Specific strengths noted included:

- Strong and growing relationship with the National Institute for Advanced Transportation Technology (NIATT) and the State's universities.
- Research program shows a broad diversity of subjects.
- In the last four years, there have been major improvements in the research program and its procedures.
- University of Idaho Professor Exchange Program provides instant feedback on research and the university is gaining "real world" engineering experience.
- Newsletter and web page are a plus – provide for dissemination and communication of research results and program information.
- Use of Research Advisory Committee and Technical Oversight Committees provides broad range of program input.
- Good support from Executive staff.
- Have completed projects having a national interest.
- There are areas with a high level of communication with partners in research.
- Those who are knowledgeable about the program are satisfied and supportive.

ACTION ITEMS

Each of the members of the Peer Exchange team found the exchange of ideas beneficial and prepared a list of action items that they plan to take back to their respective agencies to strengthen their programs. Two items common to all of the participants included:

- Establish a Western Regional Forum to discuss research issues on a quarterly basis.
- Request FHWA to resume collection and publication of Experimental Features (Cat. II) Research results.

Idaho Transportation Department found the Peer Exchange to be a valuable opportunity to exchange information with the representatives of the other states involved and to gain information from the ITD staff who participated. The exchange brought out a number of ideas to benefit and strengthen the ITD research program. With the current organization and staffing Idaho will be able to address the following issues.

1. Document the results of implementation of completed ITD research projects. Develop a method for tracking implementation results of current and future research.
2. Widen the distribution of research information through the research newsletter. Work with public affairs to showcase research success stories through Department newsletter and media. Publicize the literature search capabilities in the Department.
3. Work with the Districts to identify an individual to act as research contact within the District. Actively market the research capabilities in the Districts and at statewide technical meetings.
4. Move up the problem statement solicitation process to allow preliminary review by the Research Advisory Committee and provide a longer window for solicitation of problem statements. Provide a simplified mechanism for submittal of problem statements.
5. Work with the Research Advisory Committee to establish an emphasis and broad direction for the ITD research program.

Transportation Database Searches

ITD employees who need a literature search on a specific transportation subject can receive assistance from ITD's research staff. We will search the Transportation Research Board's Transportation Research Information Services **(TRIS)** database for you and e-mail you the results. We can be reached at ***8267*** or ***sloop@itd.state.id.us***. The **TRIS** database provides definitive international coverage of transportation-related materials, including federal and state research reports, journal articles, conference proceedings, monographs, technical papers, and research-in-progress.

If you would prefer to search **TRIS** yourself, state DOT employees can request a password from **TRB** to use to search the **TRIS** web site. Just complete the password request form at http://nas.edu/tris/pwdreqfm.html.

The **Transportation Research Bulletin** is published quarterly by the Idaho Transportation Department Research Office. The information, findings, views and recommendations in this publication reflect the views of the authors and are solicited from reliable source. However, they do not necessarily reflect the views of ITD or the FHWA. ITD makes no guarantee and assumes no responsibility for their accuracy, sufficiency or completeness.

Letters or articles are welcome**.**

STAFF

Asst. Mtls./Research Engineer
Bob Smith - 208-334-8437
or bsmith@itd.state.id.us

Editor/Lab Research Engineer
Stephen Loop - 208-334-8267
or sloop@itd.state.id.us

HOME PAGE

www2.state.id.us/itd/materials/Research/research.asp

Idaho Transportation Department
Post Office Box 7129
Boise, ID 83707-1129